

CLAIMS

1. An integrated etch and metal liner process of a substrate including a stop layer covered with a dielectric layer having a dielectric constant $k < 4$ and covered with a patterned mask material, comprising the steps of:

transferring the substrate into a transfer chamber held at below atmospheric pressure;

transferring the substrate from the transfer chamber to an etching chamber and etching the substrate according to said patterned mask material through said oxide layer to said etch stop layer to form a hole in said oxide layer;

ashing said mask material;

removing said etch stop layer exposed at a bottom of said hole;

transferring said substrate to a metallization chamber through said transfer chamber and without exposing the substrate to an atmospheric pressure;

depositing a barrier layer in said metallization chamber; and

depositing a metal seed layer.

2. The process of Claim 1, wherein said metal seed layer is a copper seed layer.

3. The process of Claim 1, wherein said barrier layer comprises tantalum.

4. The process of Claim 1, wherein at least one of said depositing steps is a sputtering step.

5. An integrated etch and metal liner process of a substrate including a stop layer covered with a dielectric layer having a dielectric constant $k < 4$ and covered with a patterned mask material, comprising the steps of:

etching according to said patterned mask material through said oxide layer to said etch stop layer to form a hole in said oxide layer;

ashing said mask material;
removing said etch stop layer exposed at a bottom of said hole;
transferring said wafer to a transfer chamber maintained at a sub-atmospheric pressure;
in a reactor coupled to said transfer chamber, depositing a barrier layer;
in a reactor coupled to said transfer chamber, depositing a metal seed layer; and,
wherein said wafer is maintained between said etching, ashing and removing steps and
during said transferring step at a sub-atmospheric pressure.

6. The process of Claim 5, wherein said barrier layer comprises tantalum.

7. The process of Claim 5, wherein at least one of said depositing steps is a sputtering
step.

8. The process of Claim 5, wherein said transfer chamber is maintained at a pressure of
less than 10^{-6} Torr.

9. An integrated etch and metal liner process of a substrate including a stop layer
covered with an oxide layer covered with a patterned photoresist mask, comprising the steps of:

a first step of transferring said substrate into a first transfer chamber maintained at a
pressure of no more than 1 Torr;

a second step of transferring said substrate from said first transfer chamber to an oxide
etch reactor;

in said oxide etch reactor, etching said oxide layer according to said mask to form a hole
in said oxide layer;

a third step of transferring said substrate from said oxide etch reactor through said first
transfer chamber to a second transfer chamber maintained at a pressure of no more than 10^{-6}
Torr;

a fourth step of transferring said substrate from said second transfer chamber to at least

one reactor to deposit a layer in said hole.

10. The process of Claim 9, further comprising ashing said photoresist layer in said oxide etch reactor.

11. The process of Claim 9, further comprising:

a fifth step of transferring said wafer from said oxide etch reactor through said first transfer chamber to a plasma ashing reactor; and

in said plasma ashing reactor, ashing said photoresist layer;

wherein said third step of transferring comprises transferring said substrate from said plasma ashing reactor through said first transfer chamber to said second transfer chamber.

12. An integrated processing platform, comprising:

a first vacuum transfer chamber;

a second vacuum transfer chamber;

a doubly gated vacuum passageway linking said first and second vacuum transfer chambers;

an oxide etch reactor connected through an openable slit valve to said first vacuum transfer chamber;

a deposition chamber connected through an openable slit valve to said second transfer chamber; and

a robot for transferring substrates between said first and second vacuum transfer chambers, said etch chamber, and said deposition chamber.

13. The platform of Claim 12, wherein said first vacuum transfer chamber is maintained at a pressure of no more than 150 Torr and said second vacuum transfer chamber is maintained at a pressure of no more than 10^{-6} Torr.